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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Charles P. Bryant

Serial No. 09/312,597

Examiner:

Filed: Herewith

Art Unit:

For: DISPERSANT-VISCOSITY IMPROVERS FOR LUBRICATING OIL COMPOSITIONS

BOX PATENT APPLICATION

Assistant Commissioner for Patents

Washington, D.C. 20231

INFORMATION DISCLOSURE STATEMENT

Sir:

Pursuant to 37 CFR 1.97 and 1.98 and in compliance with 37 CFR 1.56, the Office's attention is directed to the patents, publications and other information listed on the attached PTO-1449. A concise explanation of each document is provided herewith. A copy of each listed document is enclosed. The Examiner is requested to consider these documents, to make them of record in the present application by initialing in the spaces provided on the Forms PTO-1449, and to return copies of the initialed forms PTO-1449 to Applicants' representative in due course.

The Information Disclosure Statement is being filed within three months of filing of the national application (37 CFR 1.97(b)(1)).

The identification of any reference in this Information Disclosure Statement is not intended to be, and should not be understood as being, an admission that such reference, in fact, constitutes "prior art" within the meaning of applicable law. The "prior art" status of any reference is a matter to be resolved during prosecution.

The filing of this Information Disclosure Statement shall not be construed to be an admission that the information cited in this statement, is, or is considered to be, material to patentability as defined in 37 CFR §156(b).

The disclosure of this information is not a representation that any search has been made or that no other material information as defined in 37 CFR §1.56(b) exists.

Any modifications to the original form of any documents submitted in connection with this Information Disclosure Statement, whether by underlining, interlineation, marginalia, or otherwise, should be disregarded, as the times, persons and reasons involved in such modifications may have no relation to or bearing on the present application.

Concise Description of Cited Documents

U.S. 3,251,906 (Bauer, May 17, 1966)

In the background of the invention (column 1, lines 49-52) this patent mentions acrylate esters have been used in lubricants to provide pour point depressant and viscosity index improvement. This patent specifically teaches (column 1, line 65-column 2, line 6) that copolymers having good dispersing activity can be prepared by polymerizing together methyl or ethyl acrylate or both and one or more polymerizable monovinylidene monomers possessing hydrocarbon groups of at least a size sufficient to impart to the final copolymers solubility in a selected oil. The "other" monomers are at least one alkyl acrylate or methacrylate which supplies oil solubility. The patent also contemplates that a third polymerizable monoethylinically unsaturated compound such as styrene, vinyl alkyl ethers, vinyl chloride, etc. may be employed.

U.S. 3,252,949 (Fields et al., May 24, 1966)

This patent relates to methacrylate polymers having a high degree of syndiotacticity. They are used as viscosity improvers in mineral and synthetic oils. This reference also refers to

dispersant-viscosity improvers wherein dispersancy is provided by polymerizing with the methacrylate monomers a minor amount of polar or hydrophilic monomers.

U.S. 3,506,574 (Stambaugh et al., April 14, 1970)

This patent is related to a method for preparing graft copolymers by grafting N-vinylpyrrolidone onto a backbone containing a polymeric alkyl acrylate and/or alkyl methacrylate under polymerizing conditions and in the presence of an organic or inorganic free radical initiator. The backbone of the graft copolymer is based primarily, i.e., at least 30%, upon alkyl acrylates or alkyl methacrylates, with alkyl groups of sufficient average size to ensure solubility of the graft copolymer in the petroleum liquid product employed. Lubricating and fuel compositions are also described.

U.S. 3,732,334 (Koch et al., May 8, 1973)

Disclosed are graft copolymers useful as lubricating oil additives and prepared by grafting an imidazole having an olefinically unsaturated group in the 1- position on a backbone polymer comprising acrylic, methacrylic, fumarate, and/or itaconate esters. The products are described as graft copolymers whose principle chain comprises acrylate acid esters or methacrylic acid esters of alcohols having at least 8 carbon atoms in the alcohol group; fumaric acid esters or itaconate acid esters of alcohols having 8-18 carbon atoms in the alcohol group or mixtures of these esters with each other or with up to 50% by weight of the total mixture of acrylic or methacrylic acid esters of alcohols having 1-4 carbon atoms, of amino alkyl esters of acrylic acid or methacrylic acid, of vinyl acetate or of mixtures of these last mentioned comonomers.

U.S. 4,281,081 (Jost et al., July 28, 1981)

Disclosed is the method of making a lubricating oil additive which improves the viscosity index and has a dispersing and detergent action, which method comprises graft copolymerizing, onto an oil-soluble base polymer, from 0.5 to 10 parts of a polymerizable lactam together with 0.1 to 3 parts of a polymerizable N-heterocyclic compound, said parts being by weight of said base polymer, and the lubricating oil additives so produced.

U.S. 4,338,418 (Jost et al., July 6, 1982)

This is a divisional of U.S. 4,281,081, supra. The disclosures of these patents are substantially the same.

U.S. 4,548,990 (Mueller et al., October 22, 1985)

Described is a controlled-release, drug-delivery composition which comprises (A) a crosslinked copolymer, capable of swelling in ethanol to give a swollen copolymer containing at least 40% by weight of ethanol, and capable of swelling in water to give a swollen copolymer containing no more than 20% by weight of water, where the swelling ratio (% ethanol : % water) is 2:1 to 22:1, which comprises the copolymerization product of (a) 50 to 99% by weight of said copolymer of a water-insoluble monoolefinic monomer or (a) with 0 to 45% by weight of total monomers of a water-soluble monoolefinic monomer, with (b) 50 to 1% by weight, but no more than 20 mole % of a divinyl or polyvinyl crosslinking agent; and (B) an effective amount of a pharmaceutical medicament is useful for the controlled and prolonged release of drugs when taken orally.

U.S. 4,758,364 (Seki et al., July 19, 1988)

This patent is directed to automatic transmission oil compositions comprising a lubricating oil, a homopolymer or copolymer of monoolefins having a carbon number of 2-10 and average molecular weight of 1,000-10,000 and one or more copolymers having an average molecular weight of 5,000-50,000 selected from the group of copolymers (a) of two or more C₁₋₁₈ methacrylate esters and the group of copolymers (b) of one or more methacrylic acid esters making up (a) and one or more nitrogen-containing monomers as described in greater detail in the patent.

U.S. 4,822,508 (Pennewiss, et al., April 18, 1989)

This document describes multirange lubricating oils having high shear stability comprising paraffinic oils as their base and containing, as an additive improving the viscosity index, a mixture of at least two different polymer species, each of said polymer species being composed of monomers selected from the group consisting of

- (a) esters of methacrylic acid and acrylic acid with linear alcohols having 6 to 15 carbon atoms,
- (b) esters of methacrylic acid and acrylic acid with linear alcohols having from 16 to 30 carbon atoms,
- (c) esters of methacrylic acid and acrylic acid with branched alcohols having from 6 to 40 carbon atoms,
- (d) esters of methacrylic acid and acrylic acid with alcohols having from 1 to 5

carbon atoms, and

- (e) other monomers, different from (a)-(d), susceptible to free-radical copolymerization, and containing functional groups in the molecule,

monomers or monomers (a) being from 0 to 100 mole percent of said polymer species, monomer(s) (b) being from 0 to 10 mole percent, monomers (c), (d) and (e) combined being from 0 to 100 mole percent, and monomers (a) to (e) combined being 100 mole percent of said polymer species, said individual polymer species differing from one another by at least 10 mole percent with respect to their content of component (a).

U.S. 4,867,894 (Pennewiss et al., September 19, 1989)

Polymers adaptable to use as pour point lowering additives for petroleum oils are disclosed, said polymers comprising as comonomers therein

- (a) from 10 to 30 mole percent of methyl methacrylate,
- (b) from 10 to 70 mole percent of alkyl methacrylates having linear alkyl groups with from 16 to 30 carbon atoms in the alkyl group,
- (c) from 10 to 80 mole percent of alkyl methacrylates having linear alkyl groups with from 4 to 15 carbon atoms in the alkyl group and/or having branched alkyl groups with from 4 to 40 carbon atoms in the alkyl group,
- (d) from 0 to 30 mole percent of a free-radically polymerizable nitrogen-containing monomer having dispersing action,

and petroleum oils containing such polymers as pour point lowering additives.

U.S. 4,968,444 (Knoell et al., November 6, 1990)

Additives for n-paraffin-containing lubricating oils are disclosed, which additives are mixtures of acrylates containing

- (I) from 10 to 99 weight percent of polymers P_1 composed of
 - (a) esters of methacrylic acid and/or acrylic acid and linear C_6 to C_{15} alcohols;
 - (b) esters of methacrylic acid and/or acrylic acid and linear C_6 to C_{30} alcohols;
 - (c) esters of methacrylic acid and/or acrylic acid and branched C_8 to C_{40} alcohols;
 - (d) esters of methacrylic acid and/or acrylic acid and C_1 to C_5 alcohols; and
 - (e) monomers having functional groups, the amount of (b) being at the most 5 mole percent; and

- (II) from 90 to 1 weight percent of polymers P₂ composed of
- (a) esters of methacrylic acid and/or acrylic acid and linear C₆ to C₁₅ alcohols;
 - (b) esters of methacrylic acid and/or acrylic acid and linear C₁₆ to C₃₀ alcohols;
 - (c) esters of methacrylic acid and/or acrylic acid and branched C₈ to C₄₀ alcohols;
 - (d) esters of methacrylic acid and/or acrylic acid and C₁ to C₅ alcohols; and
 - (e) monomers having functional groups, the amount of (b) being between 10 and 70 mole percent; and a solvent therefor, wherein (e) and (e') are defined as monomers which are known for dispersant and detergent activity in oil additives.

U.S. 5,043,087 (Pennewiss et al., August 27, 1991)

Multifunctional additives for lubricating oils containing n-paraffins are disclosed, said additives comprising a solvent and a blend of polymers containing

- (I) from 10 to 99 percent by weight of one or more polymers P₁ comprising monomers selected from the group consisting of (A) esters of methacrylic acid, acrylic acid, or both
- (a) with a linear alcohol having from 6 to 15 carbon atoms,
 - (b) with linear alcohol having from 16 to 30 carbon atoms,
 - (c) with a branched alcohol having from 8 to 40 carbon atoms, and
 - (d) with an alcohol having from 1 to 5 carbon atoms, and
- (B) monomers having a functional group and capable of free-radical copolymerization, the amount of component (b) being defined by a lower and an upper limiting value in mole percent, based on component (a), the lower limiting value being $[-0.0526 \times \text{component (a)} + 10]$ and the upper limiting value being $[-0.158 \times \text{component (a)} + 25]$, with the amount of (b) being greater than 5 mole percent, the sum of components (a) and (b) ranging from 10 to 80 mole percent, based on the polymer P₁, and the amount of component (c) being from 20 to 90 mole percent, and preferably from 50 to 90 mole percent, and preferably from 5 to 30 mole percent, and the amount of component (B) being from 0 to 20 mole percent, and preferably from 2 to 15 mole percent, based in each case on the polymer P₁, and
- (II) from 90 to 1 weight percent of one or more polymers P₂ comprising monomers selected from the group consisting of

(A') esters of methacrylic acid, acrylic acid, or both with alcohols (a'), (b'), (c') and (d') which correspond to (a), (b), (c) and (d), and

(B') monomers which have functional groups in the molecule and are capable of free radical copolymerization,

wherein the amount of component (a') is from 0 to 90 mole percent, and preferably from 30 to 90 mole percent, the amount of component (b') is from 10 to 70 mole percent, the amount of component (c') is from 0 to 90 mole percent, and preferably from 10 to 90 mole percent, and most preferably from 10 to 30 mole percent, the amount of component (d') is from 0 to 50 mole percent, and preferably from 5 to 30 mole percent, and the amount of component (B') is from 0 to 20 mole percent, and preferably from 2 to 15 mole percent, based in each case on the polymer P2. In each case, the sum of (A) and (B) and of (A') and (B') is 100 mole percent.

U.S. 5,108,635 (Gabillet et al., April 28, 1992)

A composition of matter, particularly useful as a viscosity additive comprising:

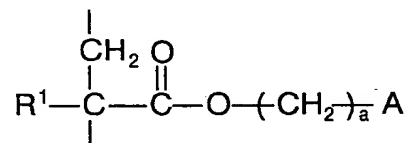
6 to 15 parts by weight of a 60/40-54/46 ethylene/propylene copolymer of Mw 155,000-250,000 (OCP),

2 to 8 parts by weight of a poly(C₁-C₂₀ alkyl methacrylate) of Mw 30,000-150,000 (PMA) ungrafted or grafted with 1 to 8% of its weight of a dispersant monomer, with a PMA/OCP ratio of 1/5 to 1/1, and

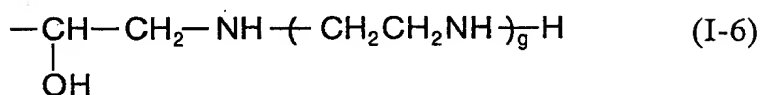
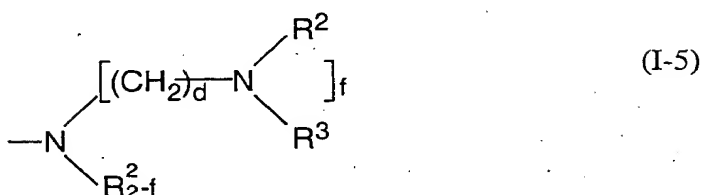
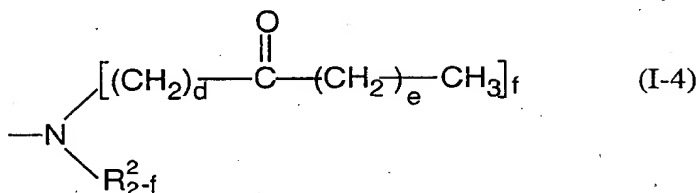
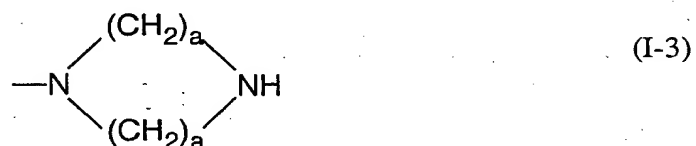
the complement to 100 parts by weight of diluent oil and lubricating compositions comprising the above additive composition.

U.S. 5,516,440 (Dasai et al., May 14, 1996)

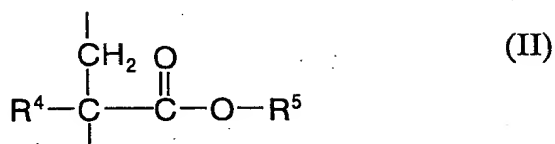
This patent is directed to a lubricating oil composition which comprises (a) a base oil comprising at least one selected from the group consisting of mineral oils and synthetic oils, (b) a copolymer having a repeating unit (I) represented by the formula (I)



wherein R¹ is hydrogen or an alkyl group having 1 to 6 carbon atoms; A is a group of the following formula (I-1), (I-2), (I-3), (I-4), (I-5), or (I-6); n is an integer of 1 to 8:



wherein each of R^2 and R^3 is independently hydrogen or an alkyl group having 1 to 20 carbon atoms; each of a and b is independently an integer of 1 to 3; each of d and e is independently an integer of 1 to 6; f is an integer of 1 or 2; g is an integer of 0 to 6; and R^1 may be the same or different every repeating unit,
and a repeating unit (II) represented by the formula (II)



wherein R⁴ is hydrogen or an alkyl group having 1 to 6 carbon atoms; R₅ is an alkyl group having 1 to 24 carbon atoms, and R⁴ and R⁵ may be the same or different every repeating unit, (c) an amine-based antioxidant and (d) a thiadiazole compound.

EP 0393899 (Rohm & Haas, October 24, 1990)

This publication relates to graft copolymers of nitrogenous monomers on polymeric substrates, to hybrid copolymers comprising such graft copolymers and random copolymers, and to methods of producing such graft polymers and hybrid copolymers.

EP 0436872 (Röhm GmbH, July 17, 1991)

Automatic transmission fluids with a Brookfield viscosity below 30,000 mPas at -40°C comprise:

- (a) a paraffinic base oil with a viscosity of ca. 4 mm²/sec at 100°C;
- (b) a dispersant comprising a copolymer (I) of at least one 1-30C alkyl(meth)acrylate, (II) and at least one monomer (III) having polar O- and/or N-contg. functional groups, where (I) has a (II):(III) molar ratio of 1:0.01-0.2 and a viscosimetrically determined molecular weight of 5,000-200,000; and (c) a conventional additive package, e.g., including flow improvers, antioxidants, antiwear agents and stabilizers, but excluding polyisobutylene-based dispersants.

EP 0439254 (Rohm & Haas, July 31, 1991)

This disclosure is concerned with polymers derived from alkyl methacrylates and N, N-dialkylaminoalkyl methacrylamide monomers. The polymers are said to be useful as additives to hydrocarbon lubricating oils for the purpose of improving the viscosity index and the detergent dispersancy, and in some instances, eliminating the need for pour point depressants.

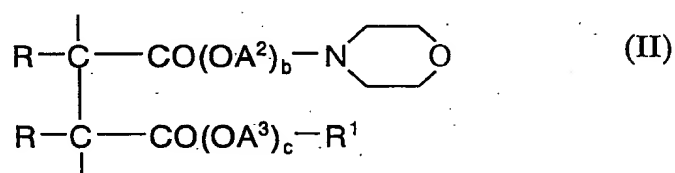
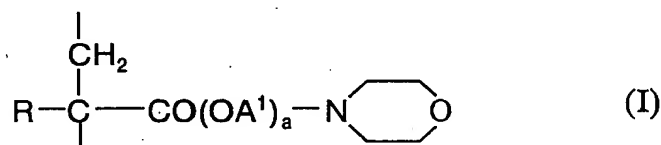
GB 1,068,283 (Röhm & Haas GmbH, May 10, 1967)

A process for the preparation of a dispersing agent for addition to lubricating oils which comprises subjecting a preformed oil-soluble homopolymer or copolymer of acrylic or methacrylic acid esters to graft-polymerization with an ethylenically-unsaturated monomer containing a tertiary nitrogen atom in the presence of a free radical catalyst whereby a graft polymer is formed

containing from 2 to 30 percent by weight (calculated on the weight of the said oil-soluble homopolymer or copolymer) of ethylenically-unsaturated monomer.

GB 1,272,324 (Sanyo Chemical Industries, February 11, 1971)

This publication relates to oil-soluble copolymer suitable for use as a lubricating oil additive having at least three types of units (A), (B) and (C), units (A) being selected from units having the general formulae (I) and (II):



wherein:

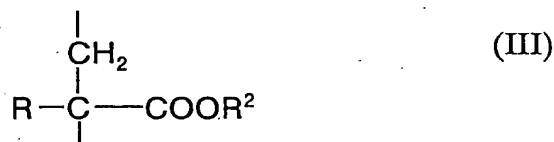
each of a and b is an integer of 1 or higher,

c is 0 or an integer of 1 or higher,

A^1 , A^2 and A^3 are the same or different alkylene groups, each R is independently a hydrogen atom or a methyl group, and

R^1 is a hydroxyl group, the residue of a hydroxyl compound or the residue of an amino compound having at least one active hydrogen atom when c is 0, and a hydroxyl group or the residue of an organic compound having at least one active hydrogen atom when c is 1 or higher,

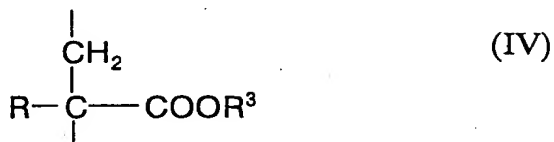
units (B) having the general formula (III):



wherein:

R is a hydrogen atom or a methyl group, and

R^2 is an alkyl group having 1 to 4 carbon atoms, and units (C) having the general formula (IV):



R is a hydrogen atom or a methyl group, and

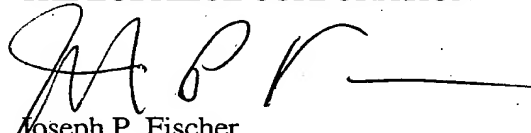
R² is an alkyl group having at least 10 carbon atoms.

The foregoing descriptions of the cited documents are based on a review thereof by the undersigned. It is not intended that the descriptions should be considered to be unfailingly accurate and complete. Copies of cited documents are enclosed herewith to provide the Office with an opportunity to review same and reach an independent conclusion as to the content and relevance thereof.

Applicants believe that no fee is required for the filing of this document. However, if any fees are due, the Commissioner is hereby authorized to charge such fee to our Deposit Account No. 12-2275.

Respectfully submitted,

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